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A contribution to the physiology of the genus *Cuscuta*.

G. J. Peirce brings out in the *Annals of Botany* for March, the results of his experiments on this interesting group of parasites, which has at various times received so much attention. It will be remembered that in a previous article Mr. Peirce described the origin, structure, and development of the haustoria of several species of *Cuscuta* and other parasites.¹

It is found that *Cuscuta* during the process of attachment to a host plant or a support has two distinct methods of forming coils. In one case by circumnutation and geotropism the steep loose coils characteristic of the majority of twining plants are formed. In the other, closely wound tendril like coils are formed as a result of the irrito-contractility of a region of the growing tip of the stem. When a seedling starts from the soil, into which its roots scarcely penetrate, it begins a rapid circumnutation from left to right, and the region near the growing tip becomes very sensitive to contact of an upright plant or some body which will furnish nutrition. It forms around such objects two or more close coils by its power of irrito-contractility. On the inner side of these coils the growth of haustoria is induced by contact. The completion of the development of the haustoria and their penetration of the host, however, depends on the supply of nourishment derived from the host. The haustoria are able to pierce the tissues of the host by the mechanical pressure of the coils, and by the chemical action of the enzymes secreted by the haustoria, prehaustoria, and cushion cells.

After *Cuscuta* has thus become attached to a host, the stem below the point of attachment dies away, it climbs upward a short distance by the ordinary twining coils when it again forms another series of contractile coils with haustoria. After the first attachment is made, the growing tip becomes sensitive to contact with any solid object, but not to gelatine or liquids. By horizontal revolution on the clinostat the parasite loses the power to form the characteristic twining coils, since it is freed from geotropic influences. During this treatment it also become non-sensitive to contact, and does not regain its normal condition for several hours. This latter fact is unexplainable in the light of our present information on reactions to contact (unless it were possible that the jar-

¹On the structure of the haustoria of some phanerogamic parasites. *Ann. Bot.* 7: 291. 1893.

ring of the clinostat has acted as a repeated stimulus, thus exhausting the power of response). The *Cuscuta* is placed in the limited category of twining plants which have the power of irrito-contractility. The comparison of its phenomena of this character, with those exhibited by tendrils are not always happily made, while throughout the paper the author seriously confuses climbing and twining plants.

Cuscuta is not markedly hydrotropic and exhibits only a weak heliotropism. The latter power is not in any way correlated with the amount of chlorophyll present, which varies inversely with the amount of nutriment received from the host. The high development of the power of movement and special senses of this parasite renders it a formidable enemy to succulent plants, whose only means of defense against it are firmness of cortex, size, and the possession of poisonous juices.

In places the article calls for the closest scrutiny of the context to bring out the meaning. The large mass of detail presented makes this obscurity in part unavoidable.—D. T. MAC DOUGAL.